

Document Modification Request

Print or Type all information (except signatures). Process procedures in accordance with 1-A01-PROC DEV-400 Procedure Process.

25. DMR No

96-DMR-RMB-CLER

1. Name/Phone/Fax/Location

BILL TODINO X5044 T-891P

2. Date

11-5-96

3. Existing Document Number and Revision

4- I57-ENV-OPS-FO 39 Rev 0

4. Document Type ☒ Procedure ☐ Plan☐ Other

5. Document Title

CALIBRATION OPERATION + MAINTENANCE OF MONITORING + FLUID HANDLING EQUIPMENT

6. Item

7. Page

8. Step

9. Proposed Modification

SEE ASSOCIATED COMMENT REVIEW SHEETS

10. Item

10a. Justification (reason for modification, EJO's, TP's, etc.)

COMBINATION OF OUI & OUZ WATER TREATMENT FACILITIES TO CREATE THE CWTF

Originator's Supervisor

11.

☒ Process☐ Do not Process (state reason in Block 10a)

JR Cuiillo

(print/sign/date)

AR Cuiillo

11/5/96

12.

☒ Process (Complete Blocks 13-22)☐ Do not Process (state reason in Block 10a)

MT Vess M. J. Vess

(print/sign/date)

11-5-96

13. New Document/ Rev No. (if new or changed)

REV 1

Complete either Section 14a or 14b, as applicable. For procedures, attach completed Procedure Modification Worksheet from 1-A01-PROC DEV-400.

14a. Type of Complete Modification

☐ New☒ Revision☐ One-Time-Use☐ Cancellation

14b. Changes (check all that apply)

☐ Intent Change☐ Nonintent Change☐ Regular☐ Editorial Correction☐ Interim Approval Requested Needed for Immediate Use (14-day limit for obtaining final approval)

Additional Attributes

☐ Temporary☐ One-Time-Use☐ Limited Distribution15. ERM Change Control Board Required: ☐ Yes ☐ No (Applicable only to new procedures, revisions and intent changes.)

List the reviewing disciplines in Block 16. After concurrence has been obtained (in accordance with 1-A01-PROC DEV-400) enter the name of the reviewer followed by /s/ in block 17. If the reviewer indicates No comments, the review signature constitutes concurrence. Enter the date concurrence is obtained in Block 18.

16a. Organization

17. Reviewer/Concurrence

18. Date

16a. Organization

17a. Reviewer/Concurrence

18a. Date

RMRS-ER

M.T. Vess M. J. Vess

11-5-96

SME

JR Cuiillo

11-5-96

GA

Greg D. Gregory Greg D. Gregory

11-6-96

19. Assigned SME/Phone/Fax/Location

JR Cuiillo AR Cuiillo X5876 04011

20. Coll Center

21. Charge Number

22. Requested Completion Date

23. Prescreen/Screen/USDO Number

AA

24. Independent Safety Review Meeting and Date

25. After obtaining ALL required signatures: Responsible Manager's Approval

(print/sign/date)

(Not required for New procedures or Revisions)

27. Effective Date

28. Expiration Date (if applicable)

ADMIN RECORD

14 10 10 11 15 15

To 3-13-96 FED Stamp

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 CONSOLIDATED WATER TREATMENT FACILITY

Procedure No.	Title	Rev No.	Effective Date
4-I49-ENV-OPS-FO 31 96-DMR-ERM-0032	Influent Collection, Transfer and Storage -CWTF Consolidated Water Treatment Facility	1	06/27/96
4-I50-ENV-OPS-FO 32	Treated Effluent Discharge OU1, Bldg 891	0	04/13/94
4-I51-ENV-OPS-FO 33	Treated Effluent Recirculation OU1, Bldg 891	2	07/31/96
4-I52-ENV-OPS-FO 34 95-DMR-000061 96-DMR-ERM-0044	Ion Exchange System - Normal Operations OU1, Bldg 891 Addition of OU1 Form ION Exchange System Normal Operations Consolidation of treatment systems into the CWTF	0 0 1	11/23/94 02/14/95 09/13/96
4-I53-ENV-OPS-FO 35	System Normal Operations Ultraviolet/Hydrogen Peroxide Oxidation and Granular Activated Carbon Systems Consolidated Water Treatment Facility	1	03/26/96
4-I54-ENV-OPS-FO 36 95-DMR-000727	ION Exchange System Regeneration Operations Operable Unit 1, Bldg 891	0 0	05/19/95 06/27/95
4-I55-ENV-OPS-FO 37 •96-DMR-RMRS-0107	Neutralization Tank - Normal Operations OU1, Bldg 891 Combination of OU1&OU2 Water Treatment Facilities to Create CWTF	1	11/23/94 11/08/96
4-I56-ENV-OPS-FO 38	Bulk Chemical Handling, Transfer, and Storage, Consolidated Water Treatment Facility	2	06/20/96
4-I57-ENV-OPS-FO 39 •96-DMR-RMRS-0108	Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment OU1, Bldg 891 Combination of OU1&OU2 Water Treatment Facilities to Create CWTF	1	12/02/94 11/08/96
4-I59-ENV-OPS-FO 41	System Normal Operations Chemical Precipitation/ Microfiltration Process Consolidated Water Treatment Facility	1	02/27/96
4-I60-ENV-OPS-FO 42	Chemical Cleaning Operations Consolidated Water Treatment Facility	1	02/27/96
4-I61-ENV-OPS-FO 43	Filter Press Operation and Cleaning Consolidated Water Treatment Facility	1	06/20/96
4-I62-ENV-OPS-FO 44	Granular Activated Carbon Transfer OU2, Field Treatability Unit	0	05/22/95
4-I63-ENV-OPS-FO 45	Chemical Handling and Mixing Operations Consolidated Water Treatment Facility	1	04/03/96
4-S72-ENV-OPS-FO 46	System Normal Operations Oil-Absorbent Media Drum Unit Consolidated Water Treatment Facility	0	05/20/96

CURRENT CLASSIFICATION REVIEW BY
 DR. HOFFMAN, CLASSIFICATION OFF
 JUNE 11, 1991

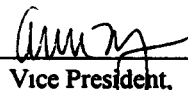
Rocky Flats Environmental Technology Site

4-I57-ENV-OPS-FO.39

REVISION 1

CALIBRATION, OPERATION, AND MAINTENANCE OF MONITORING AND FLUID HANDLING EQUIPMENT CONSOLIDATED WATER TREATMENT FACILITY

APPROVED BY



Vice President,
RMRS Environmental Restoration



Print Name

14 Nov 96

Date

DOE RFFO/ER Concurrence on file ☐ Yes ☐ No ☐ NA

Environmental Protection Agency Approval Received ☐ Yes ☐ No ☐ NA

Responsible Organization Environmental Restoration Program Division

Effective Date 11-20-96

CONCURRENCE BY THE FOLLOWING DISCIPLINES IS DOCUMENTED IN THE PROCEDURE
HISTORY FILE

Environmental Operations Management

Quality Assurance

Subject Matter Expert

USE CATEGORY 3

ORC review not required

Periodic review frequency 1 year from the effective date

LIST OF EFFECTIVE PAGES

<u>Pages</u>	<u>Effective Date</u>	<u>Change Number</u>
1-13		

TOTAL NUMBER OF PAGES 13

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1 PURPOSE

This procedure describes the normal calibration and minor maintenance operations steps required during operation of the Consolidated Water Treatment Facility (CWTF)

2 SCOPE

This procedure applies to all Environmental Operations Management employees and subcontractors

This procedure addresses

- Instrument calibration
- Quartz tube cleaning

3 OVERVIEW

This procedure contains instructions for routine maintenance which is required during operation of the CWTF. Non-routine maintenance is performed in accordance with instructions in

- The vendor maintenance manuals
- RMRS maintenance requirements

The CWTF consists of a groundwater recovery and storage system, a chemical precipitation/microfiltration (CP/MF) system, an ultraviolet/hydrogen peroxide (UV/H₂O₂) oxidation system, a granular activated carbon (GAC) column, a four column ion exchange (IX) system with units for acid and caustic regeneration of resin, a spent regenerant neutralization system, and a treated effluent storage and discharge system. System equipment and valve lists are found in 4-I49-ENV-OPS-FO 31, Appendices 3 and 4.

4 LIMITATIONS AND PRECAUTIONS

- The calibration instructions in this procedure shall be performed on a routine basis, as determined by the CWTF Responsible Manager, to ensure adequate treatment of the groundwater/surface water before discharge to the South Interceptor Ditch
- The cleaning of the quartz tubes may expose the operator to untreated, contaminated water and organic vapors. Lockout/Tagout of the UV/H₂O₂ system and following procedures will ensure that operators will not be exposed to electrical hazards, contaminated water, organic vapors or ultraviolet radiation
- During organic vapor monitoring procedures, if any reading is above background all personnel shall stop work immediately, leave the area, prevent other personnel from entering the area and notify supervision

4 LIMITATIONS AND PRECAUTIONS (continued)

- The UV chambers must be filled with water prior to energizing the lamps to avoid damage to the lamps
- Valves must be closed to isolate each probe to be calibrated, otherwise partially treated water will spill from the ion exchange piping
- The pH probe for IX-2 is not functioning and cannot be replaced due to a discontinuation by the manufacturer. The pH for IX-2 is obtained by drawing a sample from the IX-2 effluent sample port (valve V-39) and testing with a portable pH meter. Use the instructions for the portable meter for calibration
- Calibration of the pH and conductivity probes requires opening the energized IX control panel (UCP-3 Ion Exchange Panel). Use of the Energized Gear checklist prior to work, insulated tools and proper PPE must be used and adequate electrical safety training must be taken prior to performing this portion of the procedure

5 PREREQUISITES

5.1 Planning and Coordination

CWTF Responsible Manager

- [1] Ensure that all personnel involved in implementing this procedure have the appropriate health and safety training as specified in the CWTF Health and Safety Plan (HASP)
- [2] Document personnel qualifications related to this procedure in the project files in accordance with 3-21000-ADM-02 01, Training
- [3] Ensures that personnel involved with analyzer adjustments in IX control panel (UCP-3 Ion Exchange Panel) have attended Electrical Safety Training
- [4] Manages or directs the management of Lockout/Tagout activities associated with the quartz tube cleaning

Lead Operator/Operator

- [1] Calibrates the pH probe and the IX system conductivity sensors
- [2] Ensures that sufficient calibration standards are available for pH and conductivity probes
- [3] Request a Lockout/Tagout for the UV/H₂O₂ quartz tube cleaning activities
- [4] Ensure that all sources of energy associated with the UV/H₂O₂ unit are Locked and Tagged out prior to the start of work
- [5] Ensure that influent tanks have sufficient capacity to accept water drained from UV chambers prior to opening
- [6] Cleans the quartz tubes

5 1 Planning and Coordination (continued)

Lead Operator/Operator

- [7] Schematic drawings indicating valve locations on the ion exchange system can be found in the Bruner Ion Exchange Manual and in the CWTF drawing folder in the 891 office. Operators should use these drawings for verifying valve locations.

Health and Safety Specialist

- [1] Conduct a daily safety briefing covering operation of this procedure, as necessary.
- [2] Calibrate the appropriate meter for organic vapor monitoring in accordance with 5-21000-FO 15, Use of Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs).
- [3] Perform and record air monitoring for quartz tube cleaning procedure.

6 INSTRUCTIONS—INSTRUMENT CALIBRATION

The frequency of instrument calibration is dependent on several variables including gallons of water treated, quality of water being treated and consecutive days of treatment. Operators shall use process knowledge, good operating practices and manufacturer's recommendations to determine frequency of calibration. Since the calibration process involves making adjustments in an energized control panel, a sound health and safety practice would include limiting the number of times the procedure must be completed. Manufacturer's recommendation for pH probe calibration is monthly. Conductivity sensors should also be calibrated monthly, per manufacturer's recommendations.

6 1 pH Probe Calibration

CAUTION

Calibration of the probes is only performed when the IX system is shut down. This will prevent the potential of personal injury due to breaching a system under pressure, spilling partially treated water and causing damage to the IX system pH probes.

Lead Operator/Operator

- [1] Place the IX control panel UCP-3 I/O switch to ON.
- [2] OPEN the control panel and place one of the toggle switches inside the UCP-3 panel in MANUAL.
- IX-2 pH Controller (See NOTE 1)
 - IX-3 pH Controller
 - IX-4 pH Controller

This allows for input for calibration without activating automatic functions controlled by the pH controllers.

NOTE 1 *Portable pH meters can be used to measure pH on grab samples if system pH probes are not functional.*

6 1 **pH Probe Calibration (continued)**

Lead Operator/Operator

- [3] Perform one of the following actions to isolate the appropriate probe
- For IX-2, CLOSE V-130, IX-2 Effluent Isolation, and V-8, Degasifier Inlet Isolation
 - For IX-3, CLOSE V-12, IX-3 Outlet Isolation, and V-13, IX-4 Inlet Isolation
 - For IX-4, CLOSE V-131, IX-4 Effluent Isolation, and V-94, IX-4 Effluent
- [4] Don proper PPE in accordance with the requirements of the CWTF Health and Safety Plan
- [5] Place a bucket or suitable container under the probe connection, loosen and remove the pH probe
- [6] Place the probe plug in the fitting where the pH probe was removed

NOTE 2 *Use the following pH buffers for the corresponding probe*

- *For IX-2, use buffers 7 0 and 4 0*
 - *For IX-3, use buffers 7 0 and 4 0*
 - *For IX-4, use buffers 7 0 and 10 0*
- [7] Place the probe in a container of 7 0 pH calibration buffer solution, and allow the probe to stabilize at room temperature for approximately 10 minutes
- [8] Measure the temperature of the calibration buffer solution with a thermometer of known accuracy, and compare the temperature with the temperature reading on the pH controller in the Motor Control Room
- [9] **IF** the temperature indicated on the pH controller does **NOT** match the temperature of the thermometer within plus or minus 1° C,
THEN adjust the controller by pressing the CALIB button until temp/CAL appears on the screen
- [10] Press the ADJ/ENABLE button, and use the arrow keys to enter the thermometer reading
- A temperature of 25° C appears as 025
- [11] Press the ACK/ENTER button
- The controller reverts to the pH display mode
- [12] Press the TEMP button, and compare the reading with the temperature indicated on the thermometer
- [13] **IF** the reading is **NOT** within plus or minus 1° C,
THEN repeat Steps [7] and [8] until the readings of the thermometer and controller match to within plus or minus 1° C
- [14] Press the mV keypad while the pH probe is immersed in the 7 0 pH buffer solution
- [15] Verify that the display reads 000 mV (-012 mV to 012 mV)

6 1 pH Probe Calibration (continued)

Lead Operator/Operator (continued)

- [16] Press the CALIB button

This causes the STD button and the default set number to flash

- [17] Press the ADJ/ENABLE button, and use the arrow keys to display 07 0

- [18] Press the ACK/ENTER button to enter the data into the controller memory

The unit automatically reverts to the pH display

- [19] **IF** the reading is **NOT** 7 0 (6 98 to 7 02),
THEN repeat the following Steps [12] and [14] through [16] until the display is 7 0 (6 98 to 7 02)

- [20] Rinse the pH probe with deionized water, and place the probe in a container with slope calibration buffer solution (pH 4 0 or 10 0)

- [21] Allow the probe to stabilize for 5 minutes

- [22] Press the mV keypad while the probe is immersed in the slope calibration buffer solution

- [23] Verify that the display reads 177 (165 to 189 mV)

- [24] Press the CALIB button twice

SLP flashes on the display alternately with the default set number

- [25] Press the ADJ/ENABLE button, and use the arrow keys to adjust the display to 04 0 or 10 0

- [26] Press the ACK/ENTER button to enter the data into the controller memory

- [27] Verify that the controller reverts to the pH display mode, and reads 4 00 (3 99 to 4 01) or 10 0 (9 99 to 10 01)

- [28] Remove the probe plug, and install the pH probe in the proper location

- [29] Perform one of the following to restore the system to normal

- For IX-2, OPEN valves V-130 and V-8
- For IX-3, OPEN valves V-12 and V-13
- For IX-4, OPEN valves V-131 and V-94

- [30] **WHEN** the IX system is returned to service,
THEN monitor the pH probe for leaks

- [31] Place the appropriate pH Controller toggle switch inside the I/O panel in AUTO and CLOSE the control panel

6 1 pH Probe Calibration (continued)

Lead Operator/Operator (continued)

- [32] Document calibration activities on the CWTF Logbook

6 2 Conductivity Sensor Calibration

CAUTION

Calibration of the probes is only performed when the IX system is shut down. This will prevent the potential of personal injury due to breaching a system under pressure, spilling partially treated water and causing damage to the IX system conductivity probes.

Lead Operator/Operator

- [1] Perform one of the following actions to Isolate the appropriate conductivity sensor
- For IX-2, CLOSE V-130, IX-2 Effluent Isolation, and V-8, Degasifier Inlet Isolation
 - For IX-3, CLOSE V-12, IX-3 Outlet Isolation, and V-13, IX-4 Inlet Isolation
 - For IX-4, CLOSE V-131, IX-4 Effluent Isolation, and V-94, IX-4 Effluent

- [2] Don proper PPE in accordance with the requirements of the CWTF Health and Safety Plan

- [3] Place a bucket or suitable container under the probe connection and loosen and remove the conductivity sensor

- [4] Place the probe plug in the fitting where the conductivity sensor was removed

NOTE 1 *The container needs enough conductivity solution to completely cover the electrode, and needs to be large enough to prevent the conductivity sensor from touching the sides of the container*

- [5] Place the conductivity sensor in a known conductivity solution equal to approximately 10% of the scale

NOTE 2 *Use the following conductivity standards for the corresponding probe*

- For IX-2, use the 100 (10%) and 1000 (90%) $\mu\text{mhos/cm}$ standards
- For IX-3, use the 100 (10%) and 1000 (90%) $\mu\text{mhos/cm}$ standards
- For IX-4, use the 10 (10%) and 100 (90%) $\mu\text{mhos/cm}$ standards

- [6] Stir the conductivity sensor in the solution to eliminate any air bubbles that may cling to the electrodes

- [7] Energize the IX control panel UCP-3 by placing the I/O switch to ON

- [8] OPEN the IX control panel and place the selected conductivity sensor control switch from AUTO to MANUAL

- [9] Adjust the offset potentiometer on the back of the controller inside the rear panel until the controller indicates the proper display value

6.2 Conductivity Sensor Calibration (continued)

The offset potentiometer is the third screw from the left in a series of four screws at the top of the controller just beneath the sensor wiring

Lead Operator/Operator (continued)

- [10] Remove the conductivity sensor from the solution, and rinse thoroughly in distilled water
- [11] Place the conductivity sensor in a beaker of known conductivity solution equal to approximately 90% of the scale

NOTE 3 *The offset and gain potentiometers are interactive*

- [12] Adjust the gain potentiometer immediately to the right of the offset potentiometer until the controller indicates the proper display value
- [13] Repeat Steps [4] through [9] until the readings are stable
- [14] **IF** a stable reading **CANNOT** be attained,
THEN reset the temperature coefficient

[A] Press the CALIB button twice

[B] Verify that the display flashes OUTPUT and TC

[C] Press the ADJ/ENABLE button

The display stops flashing, except for the last digit

- [15] Press the up or down arrow to change the flashing digit
- [16] Press the < button to advance the flashing digit to the next position
- [17] Press the up or down arrow to change the flashing digit
- [18] Press the ENTER button when the display is correct

The display returns to the normal mode, indicating conductivity value

- [19] Remove the probe plug, and install the conductivity sensor in the proper location
- [20] Perform one of the following actions to restore the system to normal
 - For IX-2, OPEN V-130 and V-8
 - For IX-3, OPEN V-12 and V-13
 - For IX-4, OPEN V-131 and V-94
- [21] **WHEN** the IX system is returned to service,
THEN monitor the conductivity sensor for leaks

6.2 Conductivity Sensor Calibration (continued)

Lead Operator/Operator (continued)

- [22] Place the selected sensor switch control from MANUAL to AUTO, and CLOSE the IX control panel
- [23] Record calibration activities in the CWTF Logbook

7 INSTRUCTIONS—QUARTZ TUBE CLEANING

Occasionally, the quartz tubes protecting the UV lamps in the UV chambers become fouled due to reactions of contaminants in the UV influent water. Results of these reactions include scaling or film on the tubes as well as sludge production. The effect on the UV treatment system is loss of efficiency due to decreased available energy to form the hydroxyl radical necessary for the organic destruction process. The solution to this problem is to manually clean the quartz tubes.

Lead Operator/Operator

- [1] Connect a garden hose to one of the following, depending on the chamber to be opened

[A] V-107, UV Chamber #1 Drain

[B] V-109, UV Chamber #2 Drain

- [2] Place the discharge end of the garden hose in the sump pit in Building 891
- [3] OPEN V-107 or V-109 to drain the chamber to be opened
- [4] Allow the chamber to drain completely

Draining takes approximately 1 1/2 hours

- [5] Ensure that VOC monitoring is performed in accordance with the CWTF HASP

NOTE 1 *Air monitoring results will be recorded on an RMRS-approved verification sheet or recorded in the CWTF logbook*

NOTE 2 *A Lockout/Tagout must be in place before proceeding further. The Lockout/Tagout will prevent any possibility of exposing an operator to electric shock or contaminated water*

- [6] Don proper PPE in accordance with the requirements of the Health and Safety Plan
- [7] Remove the top row of access plates, and monitor for organic vapors using HNu meter
- [8] Remove the middle row of access plates and monitor for organic vapors using HNu meter
- [9] Remove the bottom row of plates and monitor for organic vapors using HNu meter
- [10] Spray down the quartz tubes inside the chamber using the garden hose connected to the plant domestic water supply

7 **INSTRUCTIONS—QUARTZ TUBE CLEANING (continued)**

Lead Operator/Operator (continued)

- [A] Allow the rinse water to drain through V-107 or V-109 to the sump pit
- [11] Using a nonscratching scrub pad, clean the deposits off the quartz tubes and off the interior surfaces of the chamber beginning with the top section and working down
- [12] Rinse the chamber from top to bottom with plant domestic water, and verify that all of the deposits have been removed when the entire chamber and all of the quartz tubes have been cleaned
- [13] Repeat Steps [11] and [12] until adequate cleaning is completed
- [14] **WHEN** the first chamber is adequately cleaned,
THEN repeat Steps [11] and [12] to clean the other chamber, as necessary
- [15] **WHEN** both chambers are adequately cleaned,
THEN
 - [A] Inspect gaskets for wear or deterioration and replace as necessary
 - [B] Install the plates over the access ports
 - [C] Ensure that the gaskets are properly placed, and the plates are secure
 - [D] CLOSE V-107 and V-109
- [16] Disconnect the garden hose, and properly store the garden hose
- [17] Request removal of Lockout/Tagout
- [18] **WHEN** the UV/H₂O₂ Unit is placed back in service,
THEN inspect the plates for leakage

CAUTION

The UV chambers must be filled with water prior to energizing the lamps to avoid damage to the lamps

- [19] **IF** a leak is detected,
THEN tighten the bolts for the plate until the leak is stopped

8 POST-PERFORMANCE ACTIVITY

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources

CWTF Responsible Manager

- [1] Ensure that the original and one copy of the Daily Log are transmitted to the ERPD Project File Center in accordance with 2-G18-ER-ADM-17 01, Records Capture and transmittal

Submission of record copies to the ERPD File Center satisfies Administrative Record requirements as defined in 3-21000-ADM-17 02, Administrative Records Screening and Processing

There are no nonquality records generated by this procedure

9. REFERENCES

Consolidated Water Treatment Facility Health and Safety Plan

1-77000-RM-001, Records Management Guidance for Records Sources

2-11000-ER-ADM-02 01, Training

2-G18-ER-ADM-17 01, Records Capture and Transmittal

3-21000-ADM-17 02, Administrative Records Screening and Processing

5-21000-FO 15, Use of Photoionization Detectors and Flame Ionization Detectors

Bruner Ion Exchange System Manual